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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/941,048	08/28/2001	Takeshi Nishi	SEL 274	5731

7590 10/18/2006

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EXAMINER	
YAMNITZKY, MARIE ROSE	
ART UNIT	**PAPER NUMBER**
1774	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	09/941,048	NISHI ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-12 and 15-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-12 and 15-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office action is in response to applicant's amendment received August 04, 2006, which cancels claims 3, 4 and 14, and amends claims 5, 7, 9 and 11.

Claims 5-12 and 15-18 are pending.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. The rejection of claims 3, 4 and 14 under 35 U.S.C. 103(a) as set forth in the Office action mailed May 03, 2006 is rendered moot by claim cancellation.

3. Claims 5-8, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien et al. in *Appl. Phys. Lett.* Vol. 74, No. 3, pp. 442-444 or Baldo et al. in *Appl. Phys. Lett.* Vol. 75, No. 1, pp. 4-6, either reference in view of Salbeck et al. in *Synthetic Metals* 91, pp. 209-215, and Grushin et al. (US 2002/0121638 A1).

O'Brien et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of α-NPD and the luminescent layer is made of CBP as a host material and PTOEP as a phosphorescent dopant. The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole O'Brien article.

Baldo et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of α-NPD and the luminescent layer is made of CBP as a host material and $Ir(ppy)_3$ as a phosphorescent dopant.

The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole Baldo article.

Neither O'Brien et al. nor Baldo et al. disclose spiro-CBP (the host material required by claims 5-8, 15 and 16) or spiro-NPD (the material required for the hole transport layer of claims 5-8, 15 and 16).

Salbeck et al. teach that by using a spiro-linkage to modify low molecular organic compounds, processability and morphologic stability can be increased while retaining the electronic properties of the compounds (e.g. see the abstract). Given the teachings of Salbeck et al., it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize spiro-CBP in place of CBP in O'Brien's or Baldo's device, and to utilize spiro-NPD in place of NPD in O'Brien's or Baldo's device, in order to increase the thermal stability of the devices. One of ordinary skill in the art at the time of the invention, having knowledge of the teachings of Salbeck et al., would have reasonably expected spiro-CBP and spiro-NPD to have the same electronic properties as CBP and NPD, respectively, while having better thermal stability than the non-spiro compounds. From Salbeck's teachings such as in the first paragraph of the introduction, and from knowledge in the art, one of ordinary skill in the art at the time of the invention would have recognized the value of using compounds of improved thermal stability in the manufacture of organic electroluminescent devices.

Claims 5-8, 15 and 16 also requiring a hole blocking layer. Claims 5, 6 and 15 require a hole blocking layer comprising a spiro-triazole compound of specified formula. Claims 7, 8 and 16 require a hole blocking layer comprising a spiro-oxadiazole compound of specified formula.

The compounds required for the hole blocking layer of claims 5-8, 15 and 16 are not disclosed in O'Brien et al. or Baldo et al. Instead, O'Brien et al. and Baldo et al. use 2,9-dimethyl,4-7,diphenyl-1,10-phenanthroline ("BCP") for the hole blocking layer (e.g. see the paragraph bridging pages 442 and 443 in the O'Brien article, and see the paragraph bridging pages 4 and 5 in the Baldo article).

Grushin et al. disclose a device comprising an emitting layer comprising an iridium compound that is capable of converting triplet excitation energy into light to be emitted, the device further comprising an electron transporting layer which may be made of "TAZ", which is the triazole component of the spiro-triazole compound required by present claim 5 and dependents, or "PBD", which is the oxadiazole component of the spiro-oxadiazole compound required by present claim 7 and dependents. Grushin et al. teach that "TAZ" or "PBD" may be used for the same purpose as 2,9-dimethyl-4,7-diphenyl-1,10-phenanthroline (Grushin's "DDPA"). "DDPA" as identified by Grushin et al. is the same as O'Brien's or Baldo's "BCP".

It would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention, having knowledge of Grushin's disclosure that TAZ or PBD could be used for the same purpose as BCP, to substitute TAZ or PBD for BCP in O'Brien's or Baldo's device. Further, having knowledge of the teachings of Salbeck et al. regarding the advantages of a spiro-linkage, one of ordinary skill in the art at the time of the invention would have been motivated to utilize spiro-TAZ or spiro-PBD in order to provide improved thermal stability while retaining the electronic properties of TAZ or PBD.

Regarding claims 15 and 16, the combination of references with O'Brien et al. as the primary reference renders the claims unpatentable wherein the metal complex is PtOEP since O'Brien et al. disclose this metal complex as a phosphorescent dopant, and the combination of references with Baldo et al. as the primary reference render the claims unpatentable wherein the metal complex is Ir(ppy)3 since Baldo et al. disclose this metal complex as a phosphorescent dopant.

4. Claims 9-12, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien et al. in *Appl. Phys. Lett.* Vol. 74, No. 3, pp. 442-444 or Baldo et al. in *Appl. Phys. Lett.* Vol. 75, No. 1, pp. 4-6, either reference in view of Salbeck et al. in *Synthetic Metals* 91, pp. 209-215, Grushin et al. (US 2002/0121638 A1) and Kreuder et al. (US 6,329,082 B1).

O'Brien et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of α-NPD and the luminescent layer is made of CBP as a host material and PTOEP as a phosphorescent dopant. The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole O'Brien article.

Baldo et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of α-NPD and the luminescent layer is made of CBP as a host material and $Ir(ppy)_3$ as a phosphorescent dopant. The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole Baldo article.

Neither O'Brien et al. nor Baldo et al. disclose spiro-CBP (the host material required by claims 9-12, 17 and 18) or spiro-NPD (the material required for the hole transport layer of claims 9-12, 17 and 18).

Salbeck et al. teach that by using a spiro-linkage to modify low molecular organic compounds, processability and morphologic stability can be increased while retaining the electronic properties of the compounds (e.g. see the abstract). Given the teachings of Salbeck et al., it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize spiro-CBP in place of CBP in O'Brien's or Baldo's device, and to utilize spiro-NPD in place of NPD in O'Brien's or Baldo's device, in order to increase the thermal stability of the devices. One of ordinary skill in the art at the time of the invention, having knowledge of the teachings of Salbeck et al., would have reasonably expected spiro-CBP and spiro-NPD to have the same electronic properties as CBP and NPD, respectively, while having better thermal stability than the non-spiro compounds. From Salbeck's teachings such as in the first paragraph of the introduction, and from knowledge in the art, one of ordinary skill in the art at the time of the invention would have recognized the value of using compounds of improved thermal stability in the manufacture of organic electroluminescent devices.

Claims 9-12, 17 and 18 also requiring a hole blocking layer. Claims 9, 10 and 17 require a hole blocking layer comprising a spiro-triazole compound of specified formula wherein the spiro linkage is a hetero-spiro linkage containing silicon. Claims 11, 12 and 18 require a hole blocking layer comprising a spiro-oxadiazole compound of specified formula wherein the spiro linkage is a hetero-spiro linkage containing silicon.

The compounds required for the hole blocking layer of claims 9-12, 17 and 18 are not disclosed in O'Brien et al. or Baldo et al. Instead, O'Brien et al. and Baldo et al. use 2,9-dimethyl,4-7,diphenyl-1,10-phenanthroline ("BCP") for the hole blocking layer (e.g. see the paragraph bridging pages 442 and 443 in the O'Brien article, and see the paragraph bridging pages 4 and 5 in the Baldo article).

Grushin et al. disclose a device comprising an emitting layer comprising an iridium compound that is capable of converting triplet excitation energy into light to be emitted, the device further comprising an electron transporting layer which may be made of "TAZ", which is the triazole component of the spiro-triazole compound required by present claim 9 and dependents, or "PBD", which is the oxadiazole component of the spiro-oxadiazole compound required by present claim 11 and dependents. Grushin et al. teach that "TAZ" or "PBD" may be used for the same purpose as 2,9-dimethyl-4,7-diphenyl-1,10-phenanthroline (Grushin's "DDPA"). "DDPA" as identified by Grushin et al. is the same as O'Brien's or Baldo's "BCP".

Kreuder et al. teach the use of hetero-spiro compounds in electroluminescent devices. The spiro linkage may have silicon as the heteroatom of the linkage. Kreuder et al. teach that compounds having a hetero-spiro linkage have a significantly reduced tendency to crystallize. For example, see column 1, line 58-c. 4, l. 49, c. 5, l. 41-c. 6, l. 35, and c. 11, l. 51-c. 12, l. 5.

It would have been a *prima facie* obvious modification to one of ordinary skill in the art at the time of the invention, having knowledge of Grushin's disclosure that TAZ or PBD could be used for the same purpose as BCP, to substitute TAZ or PBD for BCP in O'Brien's or Baldo's device. Further, having knowledge of the teachings of Salbeck et al. and Kreuder et al. regarding

the advantages of a spiro-linkage, one of ordinary skill in the art at the time of the invention would have been motivated to utilize spiro-TAZ or spiro-PBD in order to provide improved thermal stability while retaining the electronic properties of TAZ or PBD, and would have reasonably expected a hetero-spiro linkage containing silicon to provide similar advantages to a hydrocarbon spiro linkage.

Regarding claims 17 and 18, the combination of references with O'Brien et al. as the primary reference renders the claims unpatentable wherein the metal complex is PtOEP since O'Brien et al. disclose this metal complex as a phosphorescent dopant, and the combination of references with Baldo et al. as the primary reference render the claims unpatentable wherein the metal complex is Ir(ppy)3 since Baldo et al. disclose this metal complex as a phosphorescent dopant.

5. Applicant's arguments filed August 04, 2006 have been fully considered but they are not persuasive.

An additional reference has been applied with respect to the hetero-spiro embodiment (i.e. A indicates silicon) of claims 9-12, 17 and 18. Accordingly, this action is not made final.

With respect to the teachings at p. 9, l. 23-p. 10, l. 2 of the present specification, the teachings suggest that spiro-TAZ and spiro-PBD provide an unexpected advantage over spiro-BCP with respect to thermal stability. However, there is no evidence of record in support of this argument. The examiner will consider evidence in support of this argument as it would tend to show an unexpected advantage in linking TAZ moieties or PBD moieties that would not be

obtained in linking BCP moieties. Although TAZ, PBD and BCP are suggested by Grushin et al. to be useful for the same purpose, none of the references of record suggest that spiro-TAZ or spiro-PBD would have a greater improvement in thermal stability compared to the corresponding non-spiro compounds than spiro-BCP would have over BCP.

6. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
October 15, 2006

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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